

**Notice of Allowability**

Application No.

10/032,069

Applicant(s)

ISOZAKI ET AL.

Examiner

Art Unit

Tran N. Nguyen

2834

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to 4/21/03.
2. ☐ The allowed claim(s) is/are 1-6.
3. ☐ The drawings filed on \_\_\_\_\_ are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☒ CORRECTED DRAWINGS must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No. \_\_\_\_\_.
  - (b) ☐ including changes required by the proposed drawing correction filed \_\_\_\_\_, which has been approved by the Examiner.
  - (c) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1 <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                             | 2 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)          |
| 3 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                    | 4 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____             |
| 5 <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449), Paper No. _____    | 6 <input checked="" type="checkbox"/> Examiner's Amendment/Comment                  |
| 7 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
|  | 9 <input type="checkbox"/> Other  |

***Election/Restriction***

The applicant's argument regarding the species election requirement has been carefully considered and found persuasive. Therefore, the previous restriction is hereby withdrawn.

***Examiner's Amendment***

1. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicants, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it must be submitted no later than the payment of the Issue Fee.

Please change the following:

In the Drawings:

In **Figures 35-42** add **"Prior-Art"**

In the claim:

In **claim 1**, line 2, *delete* **"type"**

In **claim 1**, line 49, change **"they are"** to **—said first and second rotor units—**

In **claim 2**, line 2, *delete* **"type"**

In **claim 2**, line 49, change **"they are"** to **—said first and second rotor units—**

In **claim 3**, line 2, *delete* **"type"**

In **claim 3**, line 49, change **"they are"** to **—said first and second rotor units—**

In **claim 4**, line 2, *delete* **"type"**

In **claim 4**, line 49, change **"they are"** to **—said first and second rotor units—**

**In claim 4, line 2, delete "type"**

**In claim 4, line 49, change "they are" to —said first and second rotor units—**

***Allowable Subject Matter***

**Claims 1-6 are allowed.**

***Reason for Allowability***

The following is an examiner's statement of reasons for allowance: the primary reason for the allowance is the including, *in combination with other limitations recited in the claims*, the limitations of *an inner rotor*, as recited in claims 1-2, *or an outer rotor*, as recited in claims 3-4, *hybrid stepping motor of 6-phase and 6m-pole*, as recited in claims 1 and 3, *or 10-phase and 10m-pole*, as recited in claims 2 and 4, comprising:

a stator comprising an annular magnetic substance, 6m pieces of stator magnetic poles that are centripetally formed around the inner circumferential surface of said annular magnetic substance toward the center at equal pitches and each stator magnetic pole having a plurality of pole teeth formed on the inner tip end thereof at equal pitches, and excitation windings being wound around said stator magnetic poles;

a rotor, which is rotatable supported by said stator through a predetermined air gap with respect to the inner circumferential surface of said stator pole teeth, having a cylindrical permanent magnet magnetized in an axial direction that is sandwiched between a pair of rotor magnetic poles each having rotor pole teeth corresponding to said stator pole teeth;

wherein:

said stator magnetic poles include first magnetic poles whose pole teeth formed on the inner tip ends are line-symmetric with respect to the shape of said magnetic poles and second magnetic poles whose pole teeth are formed on the inner tip ends at the same pitches and the same number as said pole teeth of said first magnetic poles and *said pole teeth of the second magnetic poles are deviated from the pole teeth of said first magnetic poles by 1/4 pitch in the same circumferential direction, said first and second magnetic poles are alternatively arranged*

*in the circumferential direction, and said stator containing said first and second magnetic poles is divided into a first stator portion and a second stator portion that are arranged in the axial direction, and said first and second magnetic poles of said first stator portion are connected to said second and first magnetic poles of said second stator portion, respectively, in the axial direction, while said first and second stator portions are inverted in the front and back in the circumferential direction;*

wherein said rotor includes first and second rotor units that face the inner circumferential surfaces of pole teeth of said first and second stator portions with said air gap, each of said first and second rotor units is provided with a permanent magnet magnetized in the axial direction that is sandwiched between coaxial first and second rotor magnetic poles, said first and second rotor magnetic poles have rotor pole teeth around the outer circumferential surface thereof, *the number of said rotor pole teeth corresponds to that of said stator pole teeth, said first rotor magnetic pole is deviated from said second rotor magnetic pole by 1/2 of the rotor teeth pitch, and said first and second rotor units are connected in the axial direction through a non-magnetic material member such that said first and second rotor units deviated from each other by 1/4 of the rotor teeth and wherein the number of said rotor pole teeth Z satisfies the following condition:*

$Z = m(6n + 1)$  or  $Z = m(6n + 2)$  where  $m$  and  $n$  are integers equal to or larger than 1;

(for rotor hybrid stepping motor of 6-phase and 6m-pole structure)

or,

$Z = m(10n + 2)$  or  $Z = m(10n + 3)$  where  $m$  and  $n$  are integers equal to or larger than 1.

(for rotor hybrid stepping motor of 10-phase and 10m-pole structure).

The prior art of the record, generally teaches the step angle in a stepping motor is determined by the number of phases of the stator windings and the number of pole teeth formed in the rotor magnetic pole. However, none of the prior art of the record, either stand alone or in combination, has taught the number of rotor pole teeth (Z) satisfies the recited conditions for a 6-phase or a 10-phase stepping motor. Thus, comparing to the prior-art of the record, none of the prior art references of the record has taught or suggest the above-mentioned features, particularly the number of rotor pole teeth (Z) satisfies the recited conditions, in combination with other limitations recited in the claims.

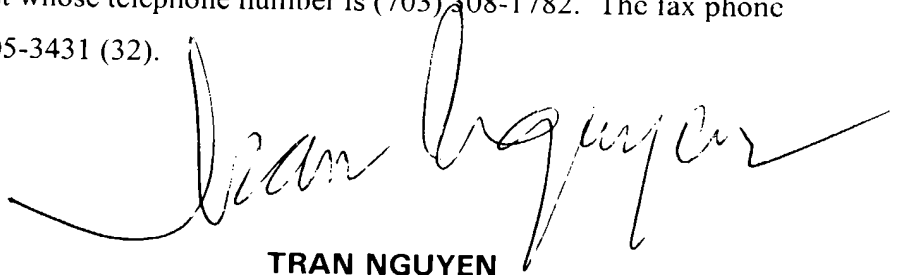
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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tran Nguyen whose telephone number is (703) 308-1639.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-1782. The fax phone number for this Group is (703) 305-3431 (32).

A handwritten signature in black ink, appearing to read 'Tran Nguyen', with a long horizontal flourish extending to the right.

**TRAN NGUYEN**

**PRIMARY PATENT EXAMINER**

**TC-2800**